

wind and rain or snow prevailed over western Minnesota, the Dakotas, and Iowa. On the 13th heavy wind, rain, and snow storms prevailed in the West and Northwest, and severe local storms were reported in Texas and Louisiana. On the 14th rain fell from the middle Mississippi valley to the Atlantic coast south of Massachusetts, high winds prevailed on the Lakes and along the south Atlantic coast, heavy thunder and hail storms occurred from Georgia to Virginia, and rain changed to snow in New Jersey and New York. During the 15th the rain area passed off the Atlantic coast, and high northeast, changing to southerly, winds prevailed on the New England coast.

VI.—Appeared off the north Pacific coast the morning of the 14th, and advanced to Alberta by the evening report of that date, with pressure below 29.50. Moving southeastward the center reached the west Gulf states on the 20th, passed thence to the Lake region by the 21st, and thence to the region north of the Gulf of Saint Lawrence by the 23d. On the 14th high winds prevailed on the north Pacific coast, reaching a velocity of 82 miles per hour from the south at Fort Canby, Wash., rain fell on the middle and north Pacific coasts, and the temperature rose 10° to 20° from Oregon to the northeast slope of the Rocky Mountains. On the 16th rain fell in the middle Mississippi and lower Missouri valleys. On the 17th the rain area extended over the Ohio Valley and Pennsylvania, severe thunder and hail storms occurred in Arkansas and western Missouri, and heavy snow was reported in extreme western Nebraska.

On the 18th rain fell from the middle-eastern slope of the Rocky Mountains to the middle Atlantic coast, severe thunder, rain, and hail storms occurred from northeastern Texas to Illinois, and heavy snow was reported in eastern Colorado. On the 19th severe thunderstorms occurred in Texas, Oklahoma Territory, Kansas, Tennessee, and Georgia. On the 20th heavy rain fell in Mississippi, Louisiana, and Arkansas, destructive local storms occurred in Kansas, Arkansas, Texas, and Louisiana, and tornadoes were reported in Arkansas and Louisiana. On

the 21st heavy rain and local storms occurred in southern Louisiana and along the middle Gulf coast, and the wind reached a velocity of 60 miles per hour from the southeast at Lexington, Ky. After the 21st this low area lost strength, and during the 23d the rain area passed off the New England and middle Atlantic coasts.

VII.—Was central on the north Pacific coast the morning of the 24th, with pressure below 29.40, passed thence to the region north of Montana by the morning of the 25th, thence to Colorado by the 26th, thence to the region east of Manitoba by the 27th, with pressure below 29.40, to the Saint Lawrence Valley by the 28th, and to the Gulf of Saint Lawrence by the 29th. On the 24th heavy gales occurred on the north Pacific coast, the wind reaching a velocity of 72 miles per hour from the southeast at Fort Canby, Wash., and rain fell from the middle and north Pacific coasts over western Montana. On the 25th the rain area extended to the western lake region. On the 26th high wind, with snow, prevailed over Nebraska and the Dakotas. On the 27th severe windstorms occurred from the Dakotas and Nebraska over the western lake region. On the 28th gales prevailed from the Lake region to the Atlantic coast, and heavy rain fell in the Southwest. High winds were noted on the North Carolina coast on the 29th.

VIII.—Appeared off the north Pacific coast on the 28th, and the morning of the 29th was central on the Washington coast, with pressure below 29.80. Passing thence southeast the storm reached Kansas by the close of the month, with pressure below 29.60. On the 28th rain fell on the middle and north Pacific coasts, and east to south gales occurred on the north Pacific coast, the wind reaching a velocity of 68 miles per hour from the south at Fort Canby, Wash. On the 29th the rain area extended over western Montana, and heavy winds were noted from the north Pacific coast to the middle plateau region. On the 30th the rain area extended to the middle Mississippi valley and the western lake region, and severe thunder and rain storms were reported from Nebraska to Illinois.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum pressure change in 12 hours, maximum temperature change in 24 hours, and maximum wind velocity.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.		
High areas.		°	°	°	°		Days.	Miles.		Inch.			°							
I.....	4	44	124	38	114		2.0	16	Portland, Oregon.....	.32	4	Sacramento, Cal.....	19	3	Keeler, Cal.....	n.	26	4		
II.....	7	53	117	50	83		5.5	23	Swift Current, N. W. T....	.56	7	Saint Vincent, Minn.....	24	7	Saint Vincent, Minn.....	nw.	36	8		
III.....	10	47	126	34	82		5.5	30	Pueblo, Colo.....	.46	13	Montrose, Colo.....	30	12	Springfield, Mo.....	nw.	30	14		
IV.....	17	42	126	38	87		6.5	20	Calgary, N. W. T.....	.42	20	Roseburgh, Oregon.....	18	19	Eureka, Cal.....	n.	30	18		
V.....	23	52	97	35	70		5.0	17	Montreal, Quebec.....	.54	24	Qu'Appelle, N. W. T.....	25	23	Chicago, Ill.....	se.	36	25		
VI.....	26	41	127	35	74		4.5	38	Saint Vincent, Minn.....	.72	28	Moorhead, Minn.....	27	27	Atlantic City, N. J.....	nw.	30	30		
Mean.....							4.8	24		.50			24					31		
Low areas.										Fall.			Rise.							
I.....	1	42	100	50	66		2.0	38	Duluth, Minn.....	.46	1	Chicago, Ill.....	20	1	Leavenworth, Kans.....	sw.	66	1		
II.....	2	51	117	47	57		4.0	35	Anticosti Island, G. of S. L.	.50	6	Green Bay, Wis.....	21	4	Amarillo, Tex.....	s.	66	4		
III.....	5	54	105	52	93		1.0	22	Prince Albert, N. W. T....	.42	5	Omaha, Nebr.....	22	6	Fort Assinaboine, Mont..	sw.	52	5		
IV.....	6	28	96	50	61		4.5	28	Charlotte, N. C.....	.34	7	Montgomery, Ala.....	11	7	Hatteras, N. C.....	n.	46	8		
V.....	9	52	115	37	76		5.0	27	Des Moines, Iowa.....	.50	13	Pueblo, Colo.....	21	9	Chicago, Ill.....	n.	65	14		
VI.....	14	47	126	51	63		9.5	25	Hatteras, N. C.....	.50	14									
VII.....	24	46	125	46	61		6.0	32	Calgary, N. W. T.....	.56	14	Roseburgh, Oregon.....	22	14	Fort Canby, Wash.....	s.	82	14		
VIII.....	29	48	125	39	98		1.5	44	Fort Canby, Wash.....	.58	24	Moorhead, Minn.....	17	27	.....do.....	se.	72	24		
									White River, Ont.....	.46	30	Pueblo, Colo.....	25	29	.....do.....	s.	68	28		
Mean.....							4.2	30		.48			20					65		

#### NORTH ATLANTIC STORMS FOR APRIL, 1892 (pressure in inches and millimeters; wind-force by Beaufort scale).

The paths of storms that appeared over the west part of the north Atlantic Ocean during April, 1892, are shown on Chart I. These paths have been determined from reports of observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

In April there is usually an increase of pressure from Bermuda to Greenland and Iceland and in the tropical regions of the Atlantic Ocean; elsewhere the pressure is lower than for March. The principal track of April storms is traced from Nova Scotia eastward to the 40th meridian, where it divides, one branch passing to Iceland and the other to the region west

of Ireland. From the ocean west of the British Isles one class of storms passes southeastward over the Bay of Biscay and another to the north of Scotland. An average of 1.4 storm per month traverses the ocean from coast to coast in April, and the average velocity of north Atlantic storms for that month is about 20 statute miles per hour.

In April, 1892, three storms, low areas I, II, and IV, traversed the ocean and reached the Bay of Biscay, numbers I and II having advanced from the Pacific Ocean and number IV from the Gulf of Mexico. The month opened with a storm of moderate energy east of the Grand Banks. This storm moved slowly eastward to a position west of the British Isles by the 4th, passed thence southward and was central west of the Bay of Biscay on the 5th, after which it apparently moved eastward. High pressure continued off the Atlantic coast of the United States until the night of the 3d, when low area I moved eastward over the Gulf of Saint Lawrence. This low area was central off the east coast of Newfoundland the morning of the 4th, and moved thence to mid-ocean as a storm of considerable energy by the 5th, thence to the vicinity of the Azores by the 6th, and to the Bay of Biscay and the Spanish Peninsula by the 8th, attended by gales of marked strength. On the 6th low area II moved south of east over the Gulf of Saint Lawrence and reached mid-ocean by the 8th, with pressure about 29.20 (742), where it remained nearly stationary until the 10th, apparently losing energy, and passed thence to the Bay of Biscay.

On the 8th low area IV moved off the middle Atlantic coast attended by fresh to strong gales, remained over New England and the Canadian Maritime Provinces from the 8th to 10th, with hard gales west of the Grand Banks, passed north of Newfoundland by the morning of the 11th, to mid-ocean by the 12th, and reached the Bay of Biscay and the Spanish Peninsula on the 13th. On the 13th a storm moved eastward from the Gulf of Saint Lawrence, reached mid-ocean by the 15th, and disappeared north of the region of observation. On the 18th an offshoot of low area VII appeared off the New Jersey coast, passed eastward to a position south of the Grand Banks by the 19th, thence north of the Grand Banks by the 20th, and disappeared north of the region of observation by the 21st. During the last decade of the month high pressure and generally settled weather prevailed over the ocean.

#### OCEAN FOG.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. East of the 55th meridian fog was reported on 12 dates; between

the 55th and 65th meridians on 9 dates; and west of the 65th meridian on 6 dates. Compared with the corresponding month of the last 4 years the dates of occurrence of fog east of the 55th meridian numbered 3 less than the average; between the 55th and 65th meridians 1 less than the average; and west of the 65th meridian 4 less than the average. The occurrence of fog along the steamship tracks west of the 40th meridian and at stations of the Weather Bureau along the middle Atlantic and New England coasts generally attended the approach or passage of general storms.

#### OCEAN ICE.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for April during the last 10 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
April, 1883 .....	40 49	52 06	April, 1883 .....	48 00	43 00
April, 1884 .....	41 26	48 46	April, 1884 .....	45 25	43 34
April, 1885 .....	41 40	49 50	April, 1885 .....	44 10	39 41
April, 1886 .....	40 51	46 39	April, 1886 .....	*47 43	30 11
April, 1887 .....	40 02	50 04	April, 1887 .....	48 00	38 18
April, 1888 .....	41 33	50 00	April, 1888 .....	47 40	49 00
April, 1889 .....	43 57	50 20	April, 1889 .....	47 16	43 11
April, 1890 .....	40 00	49 40	April, 1890 .....	47 26	35 42
April, 1891 .....	40 01	48 24	April, 1891 .....	45 33	43 32
April, 1892 .....	42 46	49 37	April, 1892 .....	48 58	44 27
Mean .....	41 18	49 33	Mean .....	47 01	41 04

\* Isolated iceberg.

The limits of the region within which icebergs or field ice were reported for April, 1892, are shown on Chart I by ruled shading.

The southernmost ice reported, an iceberg observed on the 29th, in the position given, was about  $1\frac{1}{2}^{\circ}$  north of the average southern limit, and the easternmost ice reported, several icebergs noted on the 21st in the position given in the table, was more than  $3^{\circ}$  west of the average eastern limit of ice for April.

Compared with the preceding month there was a marked increase in the quantity of ice reported. Icebergs and field ice were encountered along the east edge of the Banks of Newfoundland throughout the month, and along the southeast Newfoundland coast on the 2d and 13th. On the 21st a large ice field was reported about 80 miles east of Cape Canso, Nova Scotia. On the 24th a schooner en route from Saint Pierre to Sydney, C. B. I., was sunk by heavy ice.

#### TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for April, 1892, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in the Colorado Desert, California, in the lower Rio Grande valley, and over extreme southern Florida, where it was above 75. The mean readings were above 60 in South Carolina, Georgia, the Gulf States, western and southern Arizona, and a great part of southern California, and were above 50 south of a line traced from the

southern New Jersey coast to north-central Kansas, thence to south-central New Mexico, thence west-northwest over Arizona and along the Sierra Nevada Mountain range to north-central California, and thence to the California coast north of San Francisco. The mean temperature was lowest on the north shore of Lake Superior and at elevated stations in central Colorado, where it was below 30. The mean values were below 35 in the lower Saint Lawrence valley and from Upper Michigan over northern Wisconsin, northern Minnesota, and northern North Dakota, and were below 40 north of a line traced from southeastern Maine to eastern Montana, thence southward to south-central Colorado, and thence to extreme northwestern Montana.

#### DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was generally below the normal, except in central and eastern Texas, over the Florida Peninsula, over the east part of the Lake region, and in southeastern New York, New England, and the Canadian Maritime Provinces. The most marked departure below the normal temper-